



# Bay Planning Coalition

## **Flood Protection, Beneficial Reuse, and how Climate Change Will Shape the Future of the San Francisco Bay Area**

Presented at the 2014 Floodplain Management Annual Conference  
Santa Clara, CA  
September 3, 2014

*John A. Coleman, Chief Executive Officer*



# **BPC MISSION**

Working through a broad coalition, to advocate for sustainable commerce, industry, infrastructure, recreation and the natural environment connected to the San Francisco Bay and its watershed



# BPC's Diverse Membership Includes:

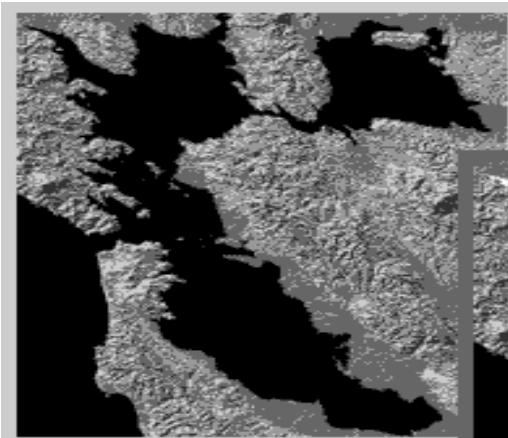


Shell Oil Products US

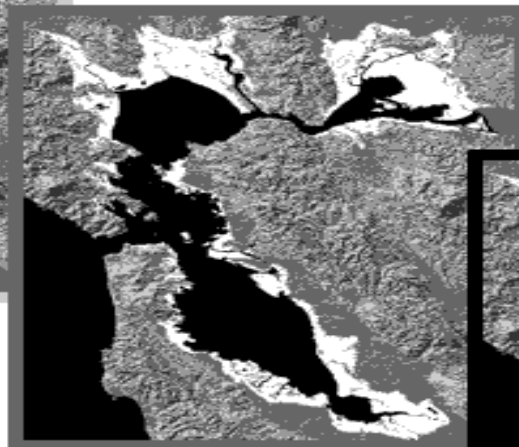




# History of San Francisco Bay Fill & Development



1849



1965

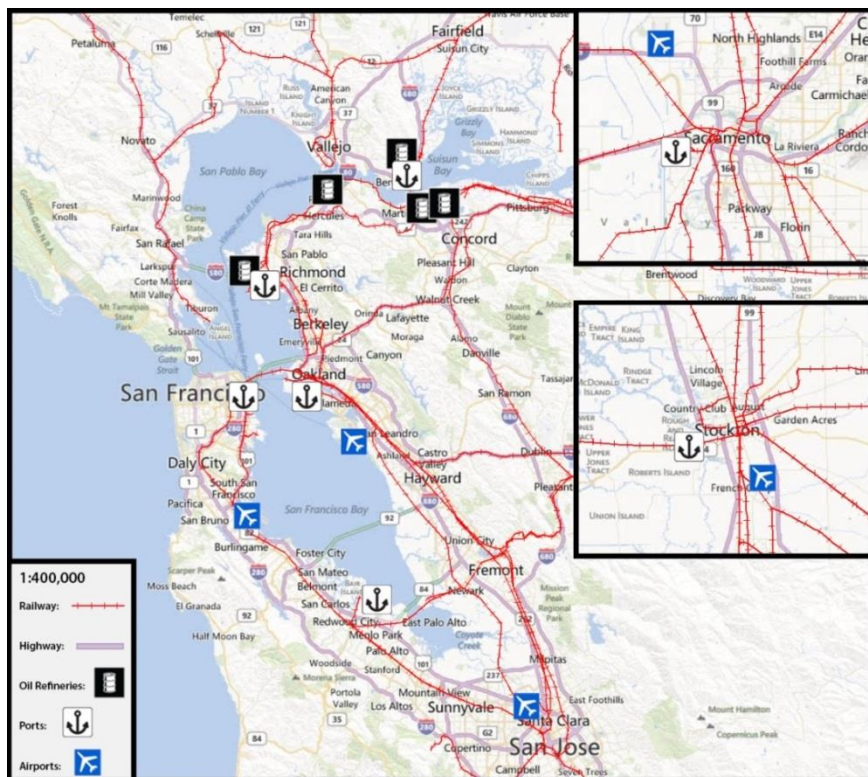


2020

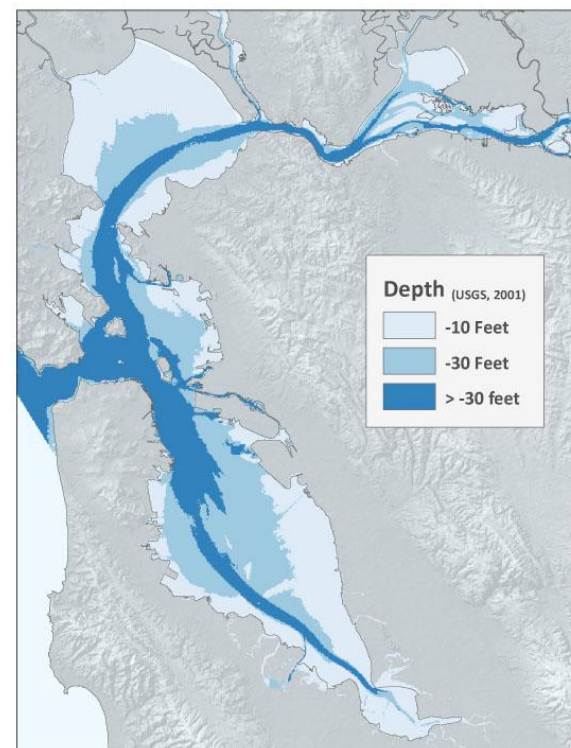
Source: BCDC



# Bay Area Trade Growth and Associated Challenges



Source: BPC



Source: San Francisco Bay Subtidal  
Habitat Goals Report





# Northern California's Trade Economy

- California has the largest Gross Domestic Product (GDP) of any state in the U.S. From 2011 to 2012, California's GDP increased by 3.5%, to a total 2012 **GDP of \$2.003 trillion**. At #2 in the US, Texas' GDP increased by 4.8%, to a total GDP of \$1.397 trillion. At #3, New York State's GDP increased by 1.3%, to a total GDP of \$1.205 trillion. The San Francisco-Oakland-Hayward metropolitan area had the **fastest real GDP growth** of any large region in the United States in 2012, at **7.4%**. Average metropolitan area GDP growth in the United States as a whole in 2012 was 2.5%.
- In 2012, California had the **10<sup>th</sup> largest GDP in the world**, between the countries of Italy (\$2.014 trillion) and India (\$1.841 trillion). Texas was 13<sup>th</sup>, between Spain and Austria, and New York was 14<sup>th</sup>, between Mexico and Spain.
- The Bay Area (Metropolitan Areas of Napa + Vallejo-Fairfield + San Francisco-Hayward-Oakland + San Jose-Sunnyvale-Santa Clara + Santa Rosa) plus the Sacramento Metropolitan Area (\$97.56 billion) and Stockton (\$20.4 billion) had a 2012 **combined GDP of over \$694 billion** as a region, which ranks **20<sup>th</sup> in the world**, between Saudi Arabia and Switzerland.



# The Economic Impact of Our Ports

## Port of Benicia (Amports)

**Exports, 2013:** 300,014 metric tons, valued at \$34.6 million

**Imports, 2013:** 200,334 metric tons, valued at \$3.9 billion

## Port of Oakland

**5<sup>th</sup> busiest seaport in the nation**

**Exports, 2013:** 6.5 million metric tons, valued at \$19.2 billion

**Imports, 2013:** 5.2 million metric tons, valued at \$23.8 billion

**Total Twenty Foot Equivalent Unit (TEU) throughput, 2013:** 2.3 million TEUs

**The Port of Oakland generated 73,000 jobs in the region, and contributed over \$617 million in tax revenue in 2010.**

## Port of Redwood City

**Exports, 2013:** 309,000 metric tons, valued at \$77.3 million (Scrap metal)

**Imports, 2013:** 1.35 million metric tons, valued at \$22.9 million (Sand, Aggregates & Other Dry Bulk)

**Port-related Jobs, 2013:** 600



# The Economic Impact of Our Ports

## Port of Richmond

**Import and Export total for privately owned terminals, 2013:** 19.4 million metric tons

**Import and Export total for city-owned terminals, 2013:** 286,518 metric tons

## Port of San Francisco

**California's busiest passenger port**

**Imports, 2013:** 1.2 million metric tons

**Exports, 2013:** 3,965 metric tons

**Estimated value of all import and export cargo, 2013:** \$60 million

## Port of Stockton

**Imports, 2013:** 1.69 million metric tons

Top imports: Liquid fertilizer, molasses

**Exports, 2013:** 1.36 million metric tons

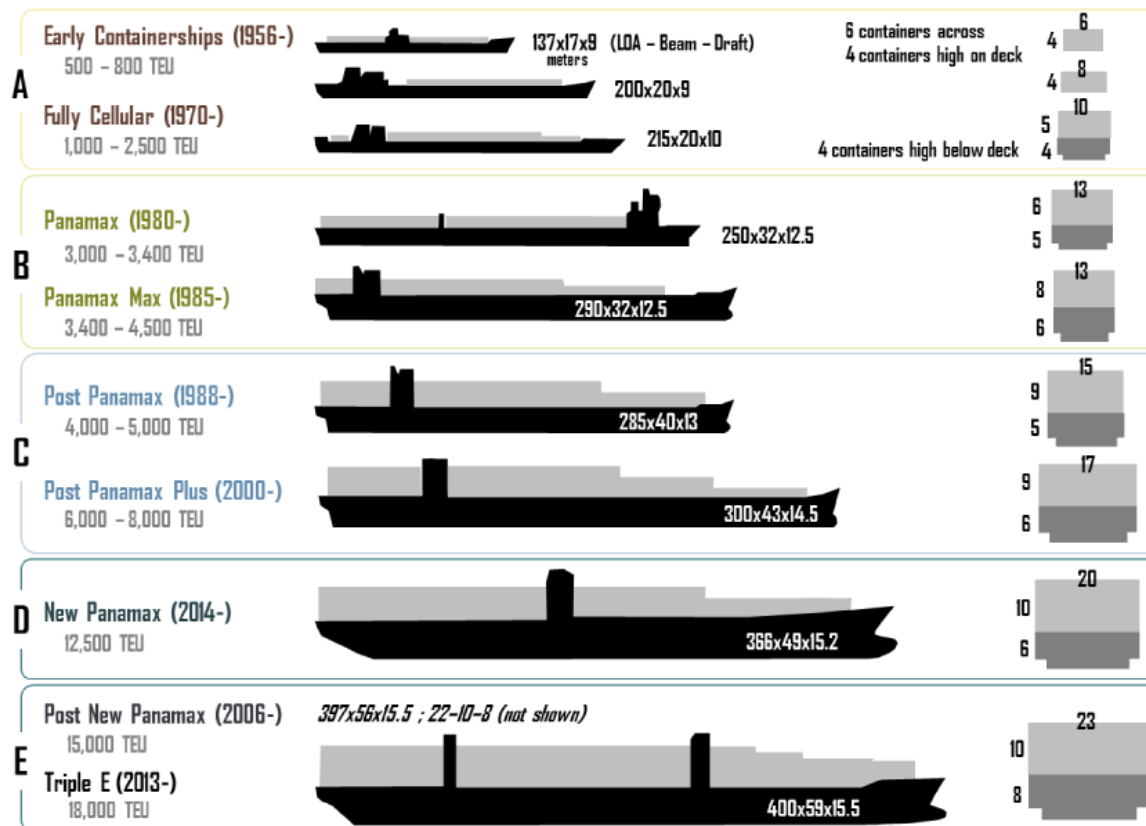
Top exports: Bulk coal, bulk sulfur

**Total Import and Export Value, 2013:** Over \$1 billion





# Mudlock & the Dredging Dilemma



Source: Hofstra University



# Long Term Management Strategy for the Disposal of Dredged Materials (LTMS)

- The San Francisco Bay Long Term Management Strategy (LTMS), which was formed in 1990, is a cooperative effort of U.S. EPA Region 9, the US Army Corps of Engineers, the San Francisco Regional Water Quality Control Board, the San Francisco Bay Conservation and Development Commission, and stakeholders in the region to develop a new approach to dredging and dredged material disposal in the San Francisco Bay area.
- Goals:
  - Reduce in-Bay disposal to 20% or less of material dredged
  - 40% of dredged material to be designated for beneficial reuse
  - The remaining 40% to be designated for ocean disposal at SF-DODS
- BPC helped to shape and implement the LTMS, and recently supported the completion of a 12 year review



# **BPC: Current Challenges and Vision for the Future**

## **2014 BPC Areas of Focus:**

- WRDDA
- SB1184 – BCDC and Sea Level Rise
- Educational and Collaborative Events on Sea Level Rise, LNG, CEQA, and other topics



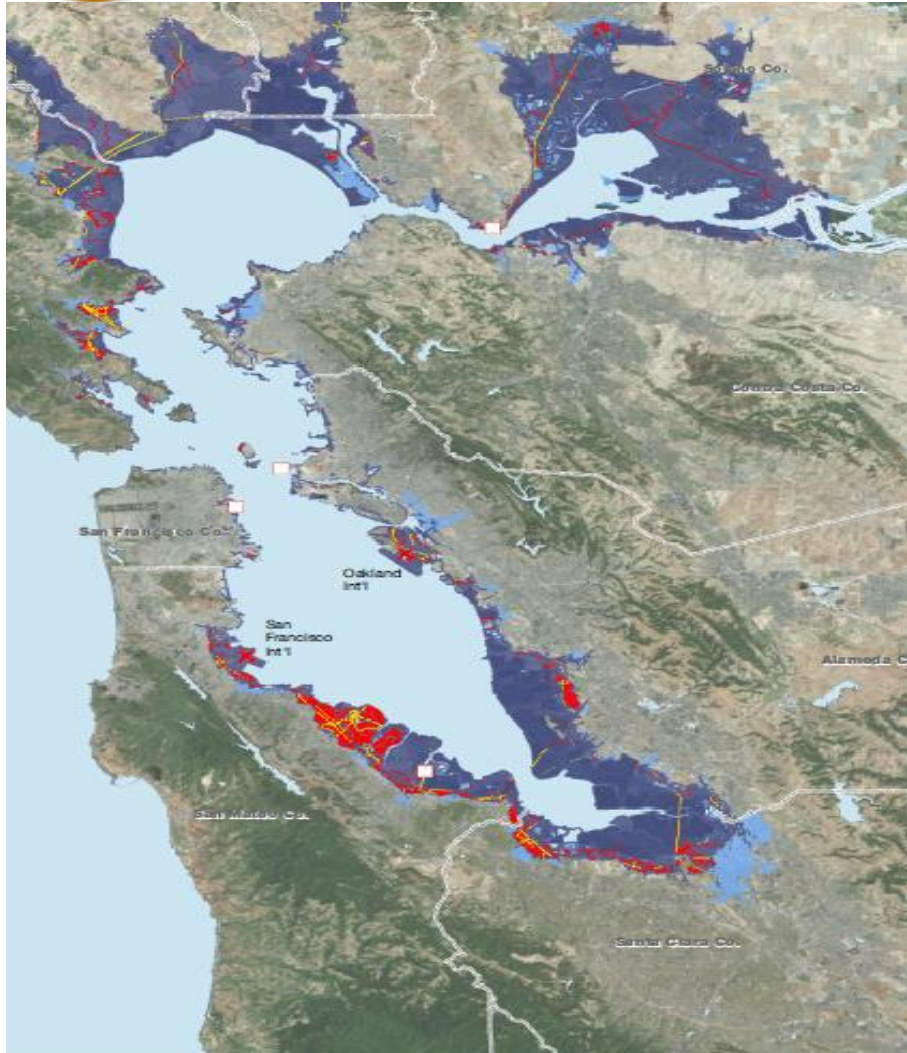
# Sea Level Rise

“Approximately 180,000 acres of shoreline are vulnerable to flooding following a 16-inch rise in sea level, and more than 213,000 acres following a 55-inch rise in sea level. This potentially affects over 250,000 Bay Area residents. The replacement value of the resources at risk is about \$62 billion.”

-Testimony of the Bay Conservation and Development Commission to the Little Hoover Commission, October 2013



# Today's Flood is Tomorrow's High Tide



Area subject to high tide with 16 inches of sea level rise



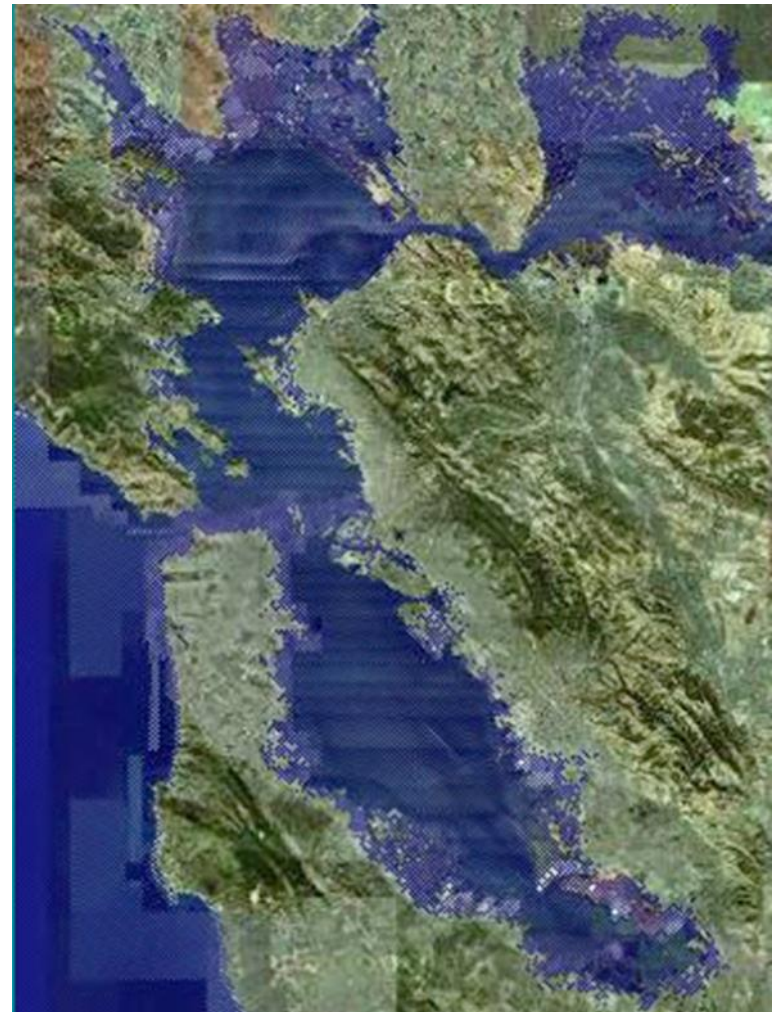
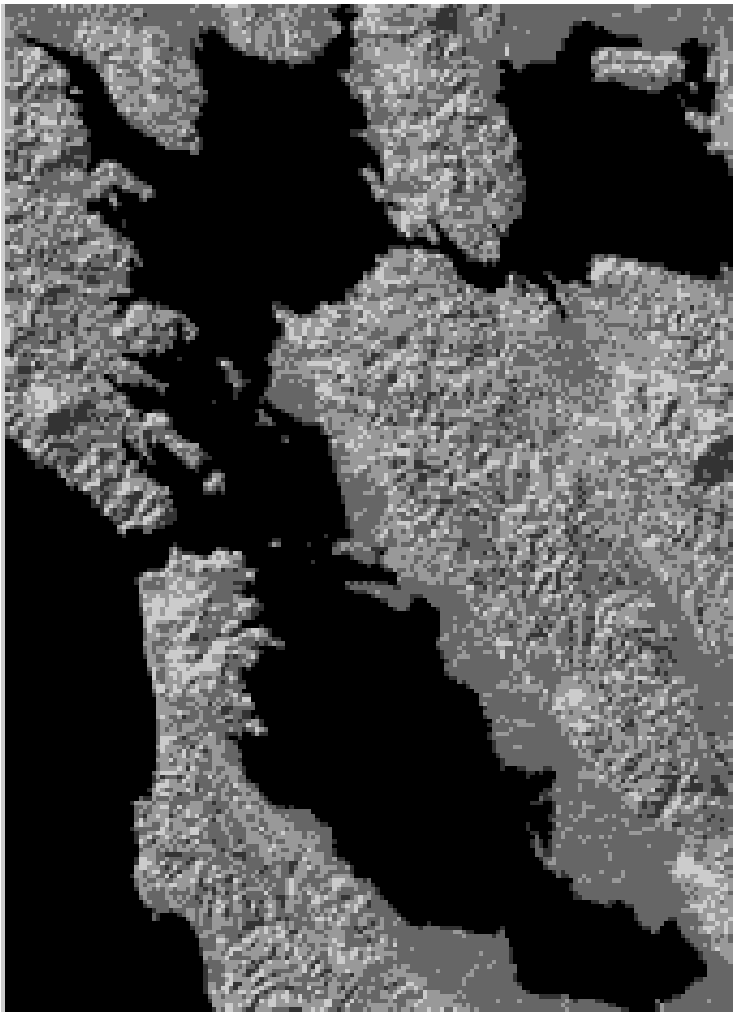
Current 100-year flood plain

Source: Metropolitan Transportation Commission



1849

2100

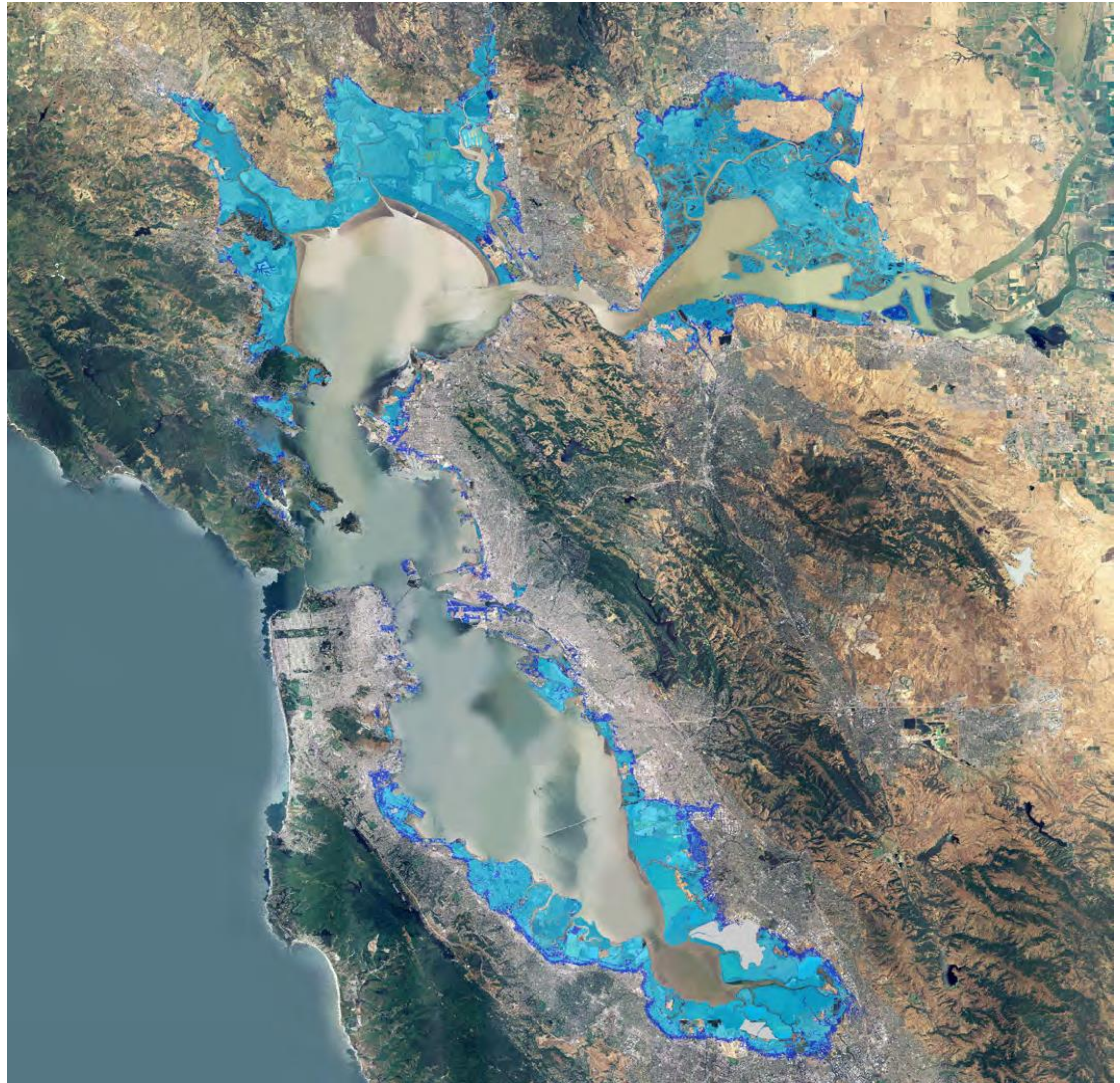


Source: San Francisco Bay Conservation and Development Commission





# 16-Inch and 55-Inch Sea Level Rise By End Of Century-- San Francisco Bay Area



Source:

Knowles, N. 2008. Siegel, S.W. and P. A. M. Bachand, 2002.



# Two Projections for Sea Level Rise

- 16 inches, or 40 centimeters, by 2050
- 55 inches, or 140 centimeters, by 2100
- With no action, at 55 inches 270,000 people in our region would be flooded, and shoreline damage would be at 62 billion dollars

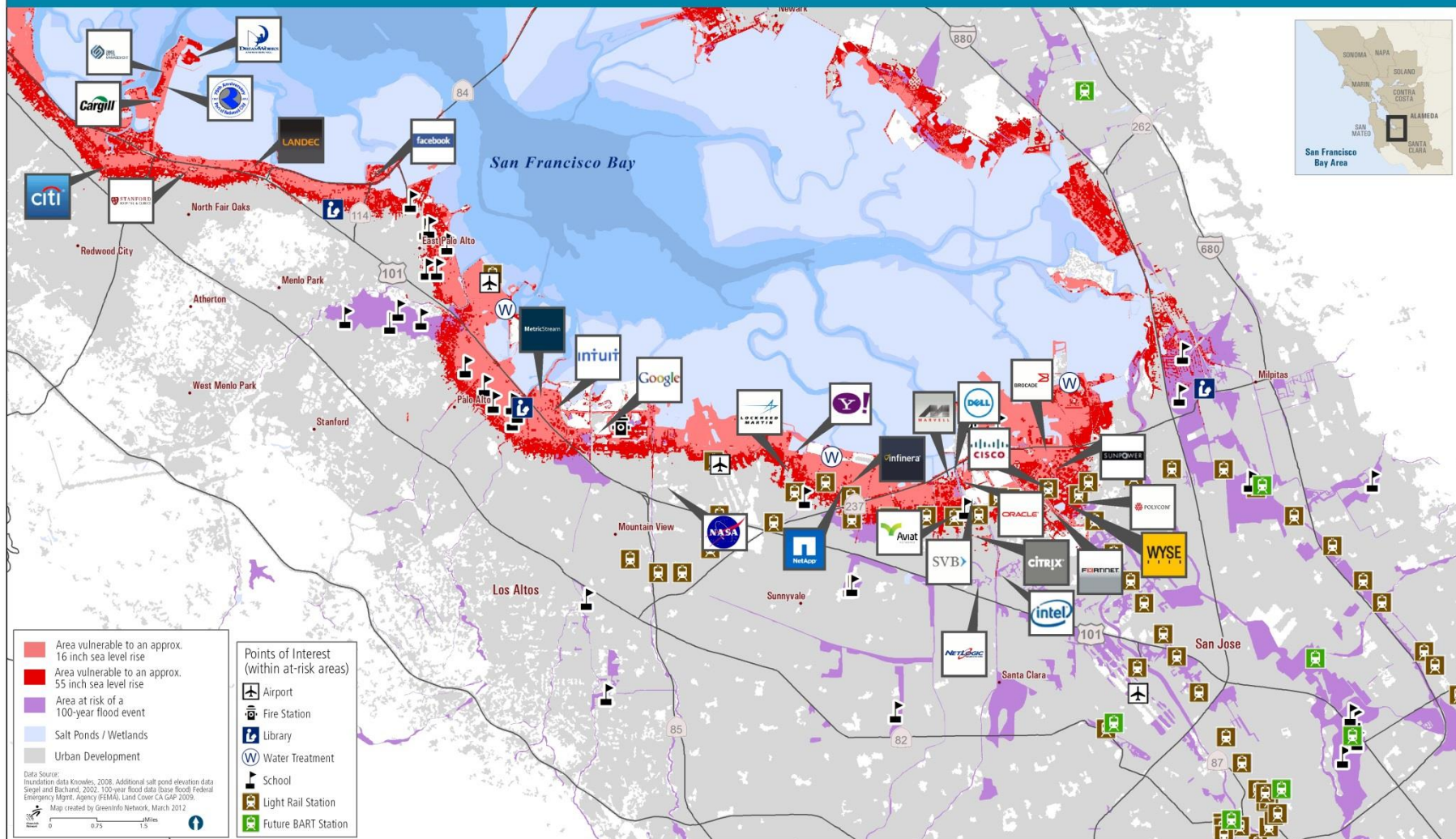




# Vital Infrastructure at Risk of Flooding in the South SF Bay

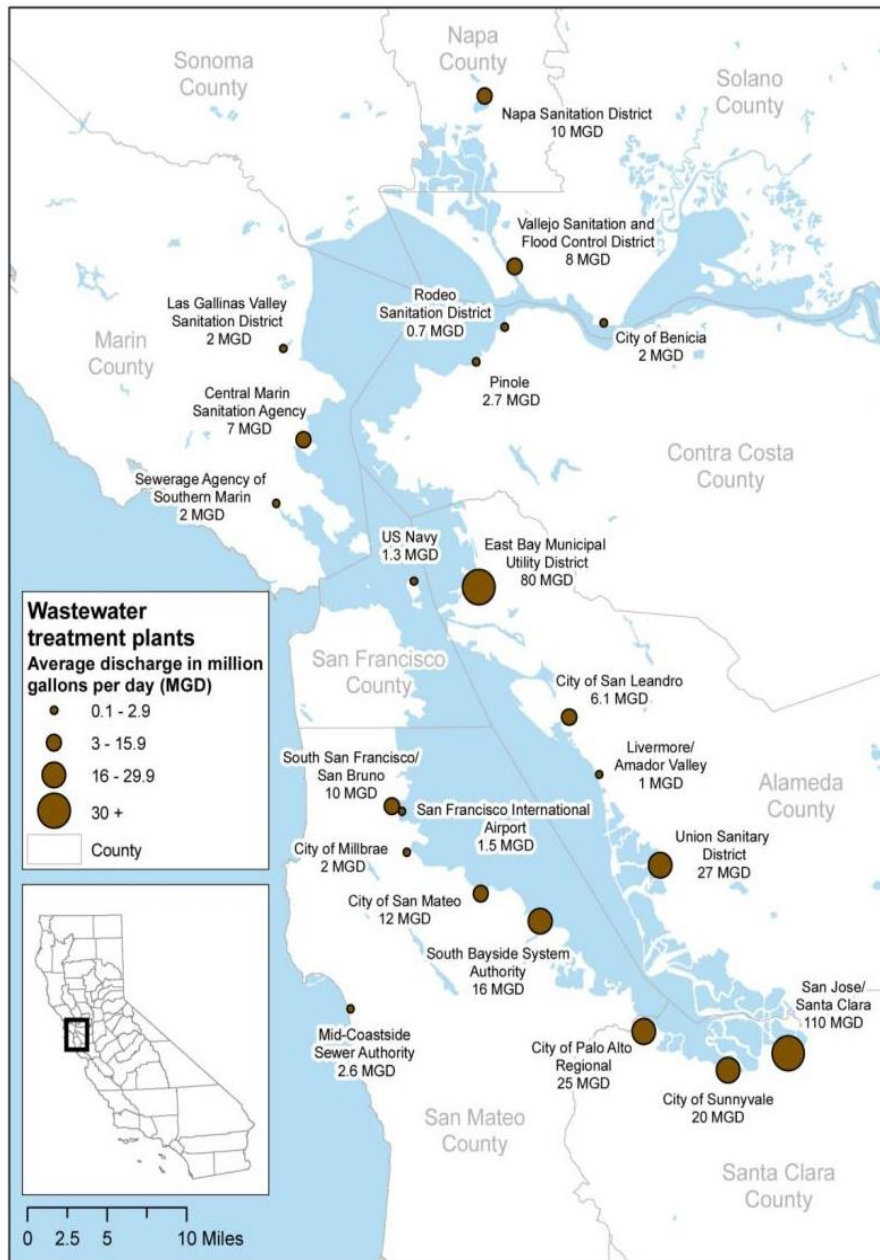
## Flood Risk and Sea Level Rise – South Bay

*Economic Impact, San Francisco Bay Area*



# Wastewater Treatment Plants

- *This map shows the Bay Area wastewater treatment plans that are vulnerable to the projected levels of sea level rise for the next 100 years*
- Most wastewater treatment plants are within potentially impacted flood zone areas
- → Potential public safety issue



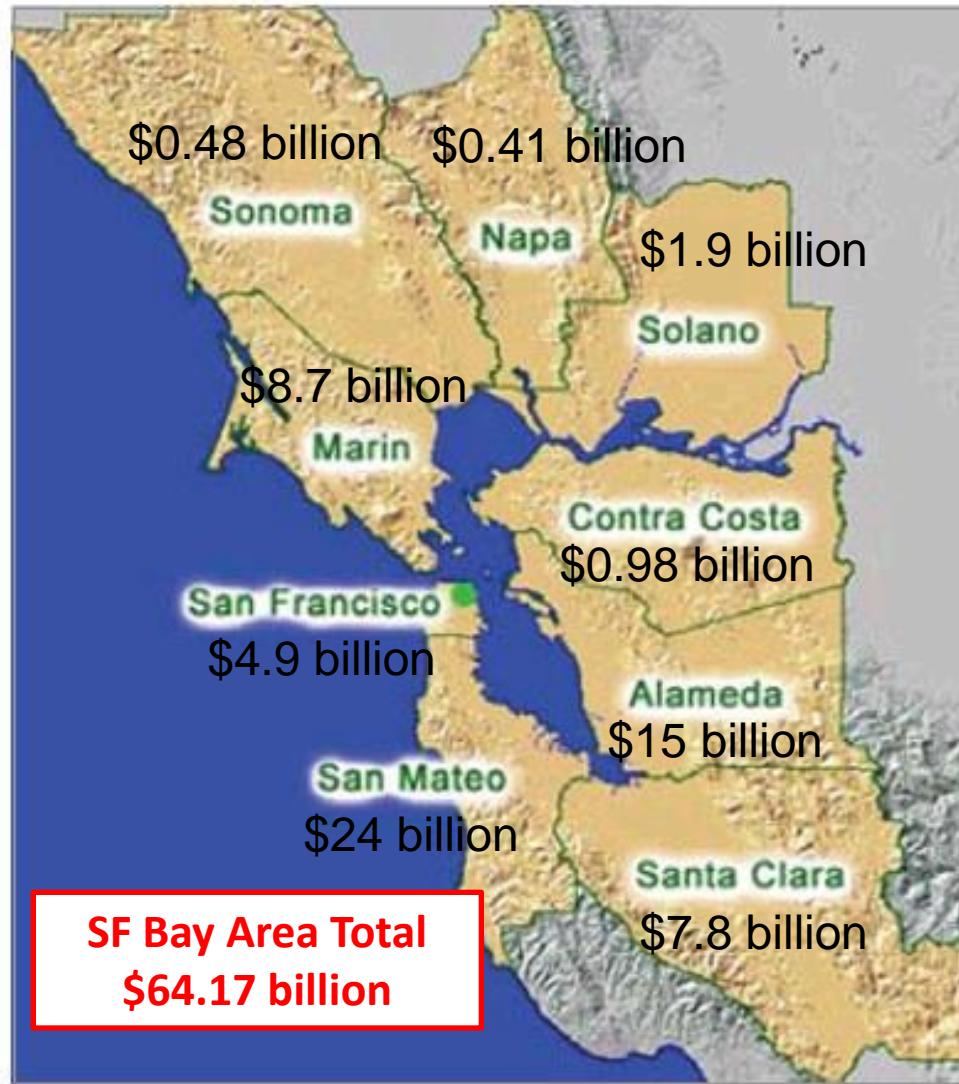
**San Francisco Bay wastewater treatment plants vulnerable to a 100-year coastal flood with a 1.4-meter sea-level rise**

Data sources: USGS/Scripps Institution of Oceanography, EPA PCS Database, CaSIL, ESRI.  
[http://www.pacinst.org/reports/sea\\_level\\_rise](http://www.pacinst.org/reports/sea_level_rise)





# Replacement value of buildings and contents vulnerable to a 100-year coastal flood with a 1.4 meter sea-level rise



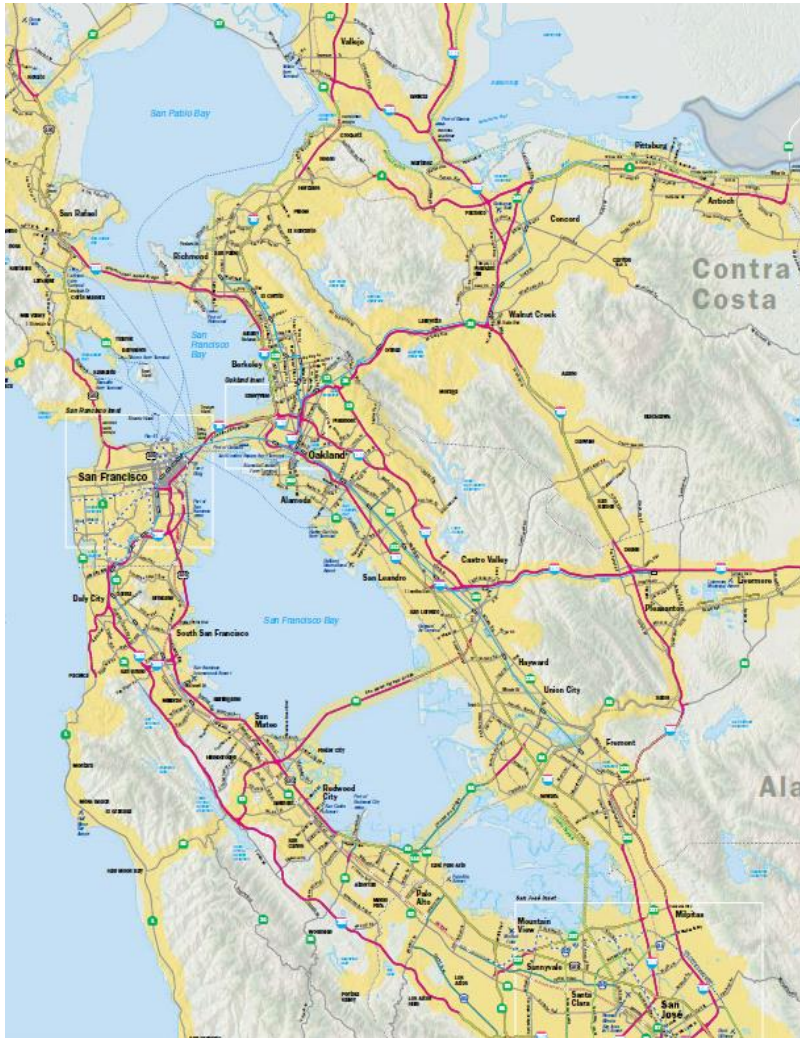
## Sources:

California Climate Change Center: The Impacts of Sea-Level Rise on the California Coast, Heberger, Cooley, et al. (March 2009).

U.S. Department of Transportation, Metropolitan Transportation Commission



# Highway Infrastructure



- Most major highways, bridges, and rail line connections are within potentially impacted flood zone area

Source: Metropolitan  
Transportation Commission 2001  
Metropolitan Transportation  
System Map



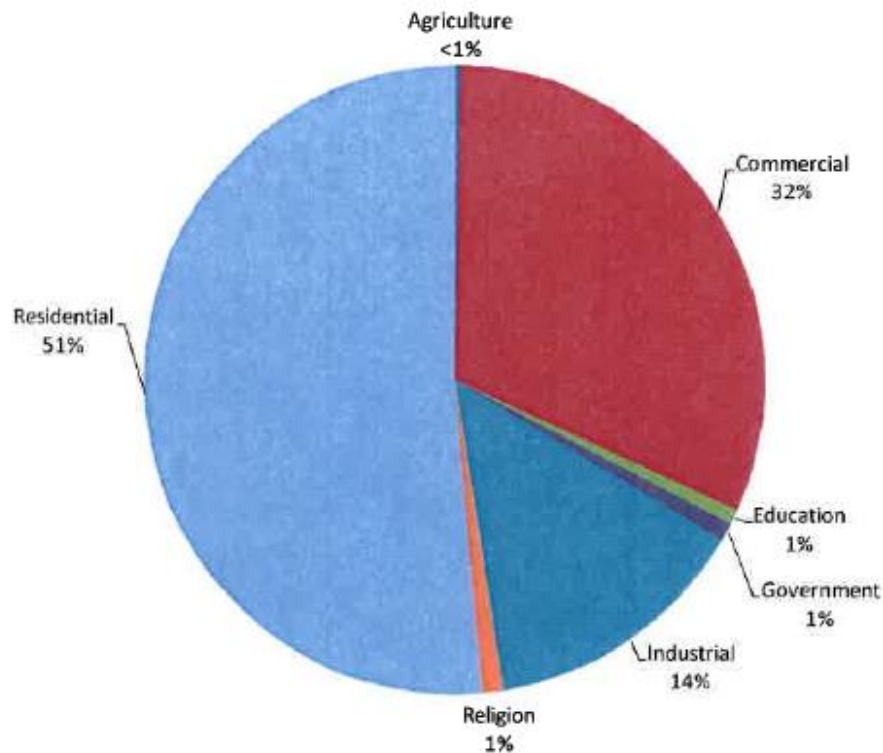


# Impact to Airports

- 72% of San Francisco International and Oakland International Airports would be damaged in the event of a 16” storm surge
- 93% of the Airports would to be damaged by a 55” surge
- This would affect the 30 million airline passengers and 1 million metric tons of trade goods that currently travel through those airports



# Potentially Impacted Buildings By Flooding



**Figure 34. Replacement value of buildings and contents at risk of a 100-year flood with a 1.4 m sea-level rise on San Francisco Bay, by major economic sector**



# Innovative Approaches to Sea Level Rise Adaptation and Flood Management

## Beneficial Reuse of Dredged Sediment for Wetlands Restoration

Beneficial reuse of dredged materials for levee building and wetland enhancement means less dredged sediment going back into the Bay or ocean, and more protection for our world-class infrastructure from the inevitable flooding associated with sea level rise



# **Innovative Approaches to Sea Level Rise Adaptation and Flood Management**

Much of the marshland that historically covered the edges of the San Francisco Bay has been lost to diking and flooding or draining for development or salt production. Now, public-private partnerships are working to restore 100,00 acres of historic wetlands.

Along with obvious habitat and carbon sequestration benefits, these wetlands offer a unique method to battle sea level rise and storm surges through wave attenuation.



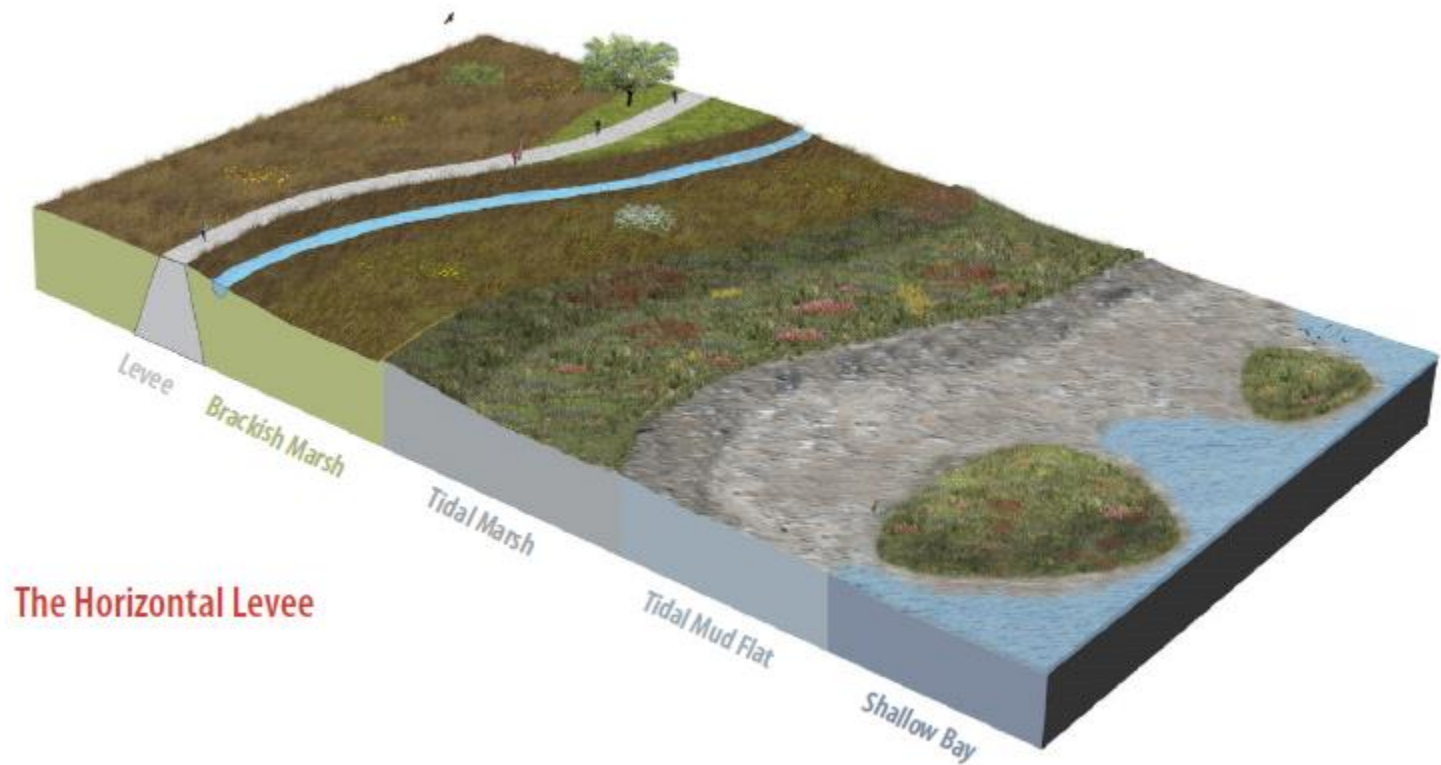
# Innovative Approaches to Sea Level Rise Adaptation and Flood Management

- Tidal Marshes reduce shoreline flooding
- Tidal marshes are less costly to build than levees
- “Tidal marsh can reduce wave energy in extreme storm events by over 50%”

*-The Bay Institute Report: The Horizontal Levee*



# The Horizontal Levee



**The Horizontal Levee**





# The Horizontal Levee

The horizontal levee consists of a tidal marsh portion and a brackish marsh portion, leading gradually up to an impermeable berm or wall. In addition to providing more (and more diverse) habitat, the horizontal levee's wave attenuation effects would necessitate lower (and thus less costly) seawalls at the landward edge.



## Other thoughts on Flood Management

Flood management is becoming part of California's commitment to Integrated Regional Water Management (IRWM)

- Accomplishes multiple benefits of protecting communities while contributing to “co-equal goals” of improving ecosystem restoration and water supply reliability



# Integrated Approach to Flood Management

- Traditional Structural and Operational Responses (detention, channelization, levees, system operations)
- Nonstructural Approaches (land use planning restrictions, easements, floodplain management, insurance, public education)
- Restoration of Natural Floodplain Functions (slowing and recharging flood waters and ecosystem restoration )
- Emergency Management Responses



# IRWM Benefits

- Incorporates diverse set of stakeholders to coordinate, cooperate, and collaborate to achieve multiple objectives
- Fosters agency interaction on planning and identification of investment priorities and funding
- Potential for reduced permitting and mitigation process costs
- Potential for improving governance and policy
- Coordination across geographic and agency boundaries to pool and leverage



# Concerns and Challenges for the Future

- Climate Change & Sea Level Rise
- Land use planning and management – need to avoid floodplains and recharge areas; encourage low-impact development
- Sediment management – preserve flood-carrying capacity
- Watershed and forest management – reduce peak flows and sedimentation
- Agricultural land management – flood easements and recharge
- Ecosystem restoration – how to integrate it
- Conveyance and surface storage improvements – capturing runoff and controlling flood flows
- System reoperation – better hydrologic forecasting and coordinated reservoir operations.
- Reservoir and floodplain storage – more capacity is essential statewide



# BPC: Addressing Challenges and Vision for the Future

**Bay Planning Coalition Vision:** Provide visionary leadership for San Francisco Bay stakeholders as an effective coalition that vigorously advances solutions for a thriving economy, environment and community.